

Constituents of Root of *Odontioda* Marie Noel ‘Velano’

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(Received April 25, 2016)

Seven compounds (**1-7**) were isolated from the root of *Odontioda* Marie Noel ‘Velano’. These were identified as phenanthrene and stilbene derivatives with spectroscopic analysis. **1**, **3** and **4** reported here were isolated for the first time from this plant.

Key words: *Odontioda* Marie Noel ‘Velano’; phenanthrene,

The Orchidaceae family is widely considered to be the largest plant family in the world with over 800 genera and at least 24000 species.¹⁾ Various pharmacologically active components have been isolated from some orchid species. For example, dendrobine, which is a tetracyclic ring system alkaloid isolated from the ornamental orchid *Dendrobium nobile*, shows antipyretic activity.²⁾ Homoeriodictyol is a flavanone showing antiplatelet aggregation activity obtained from *Dendrobium densiflorum*.³⁾ *Odontioda* Marie Noel ‘Velano’ (Orchidaceae) is an intergeneric hybrid of *Odontoglossum* and *Cochilida*. *O. Marie Noel ‘Velano’* is mainly cultivated as an ornamental plant. We have previously reported the isolations of phenanthrenes, 5-hydroxy-2, 3-dimethoxy-1, 4-phenanthrenequinone and ephemeranthoquinone B from the bulb of this plant and their cytotoxicity against oral squamous cell carcinoma and leukemic cell lines.⁴⁾ Furthermore, we have isolated other phenanthrenes with inhibition activity on osteoclast differentiation induced by the receptor activator of nuclear factor – κ B ligand (RANKL) from *O. Marie Noel ‘Velano’*.⁵⁾ There are no reports concerning studies on the constituents of this material besides ours. Therefore, we further investigated the constituents of this material to clarify the whole picture of secondary metabolites. As a result, seven known compounds were

isolated. Some of them were isolated for the first time from this plant.

Roots of *O. Marie Noel ‘Velano’* were purchased from the Orchid Garden Co., Ltd., Japan, in November 2012. The root of *O. Marie Noel ‘Velano’* (1.9 kg) was extracted with MeOH two times under reflux for 2 hrs. The MeOH extract was concentrated under reduced pressure, and the concentrate portion (41.6 g) was passed through a Diaion HP-20 column (H₂O \rightarrow 50% aqueous MeOH \rightarrow MeOH \rightarrow acetone) to afford H₂O elution (5.0g), 50% aqueous MeOH elution (5.1g), MeOH elution (15.5g) and acetone elution (4.6g). The MeOH elution was chromatographed on TOYOPEARL HW-40F with MeOH, and finally with acetone alone to obtain seven fractions (Fr. MM-1; 0.18g, MM-2; 1.22g, MM-3; 1.22g, MM-4; 0.80g, MM-5; 0.18g, MM-6; 0.77g, MM-7; 0.15g). Fr. MM-4 (0.80g) was purified with reversed phase HPLC (Senshu Pak ODS ϕ 10 x 150 mm, H₂O : acetonitrile = 6:4 containing 0.1% formic acid, 3.0 ml/min, isocratic, detected at UV 254 nm) to obtain lusianthrindin (**1**, 6.8 mg),⁶⁾ ephemeranthoquinone B (**2**, 1.9 mg),⁷⁾ flavanthrinin (**3**, 2.9 mg),⁸⁾ and 4,9-dimethoxy phenanthrene-2,5-diol (**4**, 3.1 mg).⁹⁾ Fr. MM-3 (1.22g) was also purified with reversed phase HPLC (Senshu Pak ODS ϕ 10 x 150mm, H₂O : acetonitrile = 6:4 containing 0.1% formic acid, 3.0ml/min, isocratic, detected at UV 254 nm) to

obtain batatasin III (**5**, 7.8 mg),¹⁰⁾ hircinol (**6**, 4.1 mg),¹¹⁾ and 3'-O-methylbatatasin III (**7**, 8.7 mg).¹²⁾ These isolated compounds were identified by comparison of spectroscopic data to literature values. **1**, **3** and **4** were isolated for the first time from this plant.

We have conducted research on the constituents of *O. Marie Noel* 'Velano'.¹³⁾ In our previous research, five flavonoids (linarin, apigenin 6-C-neohesperidoside, apigenin 7-rutinoside, (*S*)-2-naringenin 6-C- β -glucopyranoside and (*R*)-2-naringenin 6-C- β -glucopyranoside), six phenanthrenes (hircinol, flavanthrinin, 4,9-dimethoxyphenanthrene-2,5-diol, 5-hydroxy-2,3-dimethoxy-1,4-phenanthrenequinone, and lusianthridin), two stilbenes (batatashin III and 3-O-methylbatatashin III), and a steroid (β -sitosterol) were isolated from *O. Marie Noel* 'Velano'. On the basis of our research about constituents of this orchid, phenanthrene was included in the leaf, root and bulb without maldistribution. Stilbene was found in the root especially, while flavonoid and sterol were included in the leaf peculiarly. It is said that flavonoid shows antioxidant activity. Therefore, flavonoid included in the leaf may protect the leaf conducting photosynthesis against harmful ultraviolet rays. Moreover, stilbene is known to be a precursor for phenanthrene in its biosynthesis. Stilbene produced as a precursor for phenanthrene in the root may be transported to all parts of the plant. Sites where various chemical conversions like oxidation and reduction are conducted then lead to a variety of phenanthrenes.

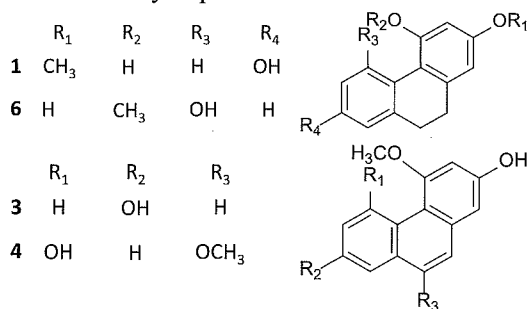


Fig. 1. Structures of Compound **1-7** from *Odontioda* Marie Noel 'Velano'.

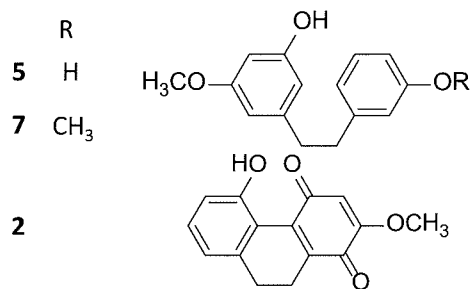


Fig. 1. Structures of Compound **1-7** from *Odontioda* Marie Noel 'Velano' (continued).

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